



SNS COLLEGE OF ALLIED HEALTH SCIENCES
SNS Kalvi Nagar, Coimbatore - 35
Affiliated to Dr MGR Medical University, Chennai



DEPARTMENT OF CARDIOPULMONARY PERFUSION CARE
TECHNOLOGY

COURSE NAME: PATHOLOGY II

II YEAR

UNIT III : PATHOLOGY OF KIDNEY

TOPIC 7 : PYELONEPHRITIS

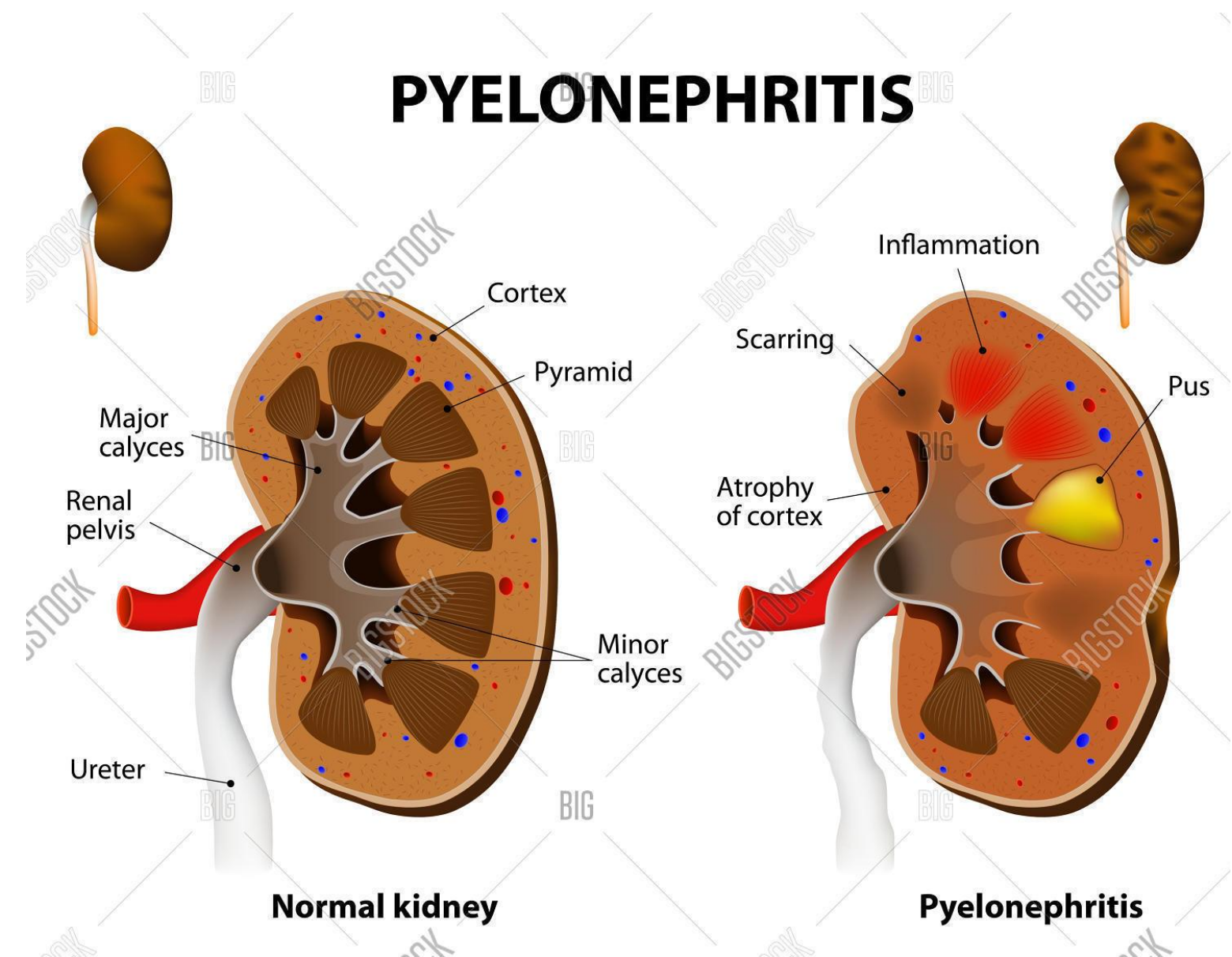
Pyelonephritis

Renal Pelvis of Kidney

- It is the funnel-like dilated part of the ureter in the kidney.
- This structure receives urine from the collecting duct for passage into the ureter

Pyelonephritis

- Inflammation of the parenchyma and lining of renal pelvis of kidney





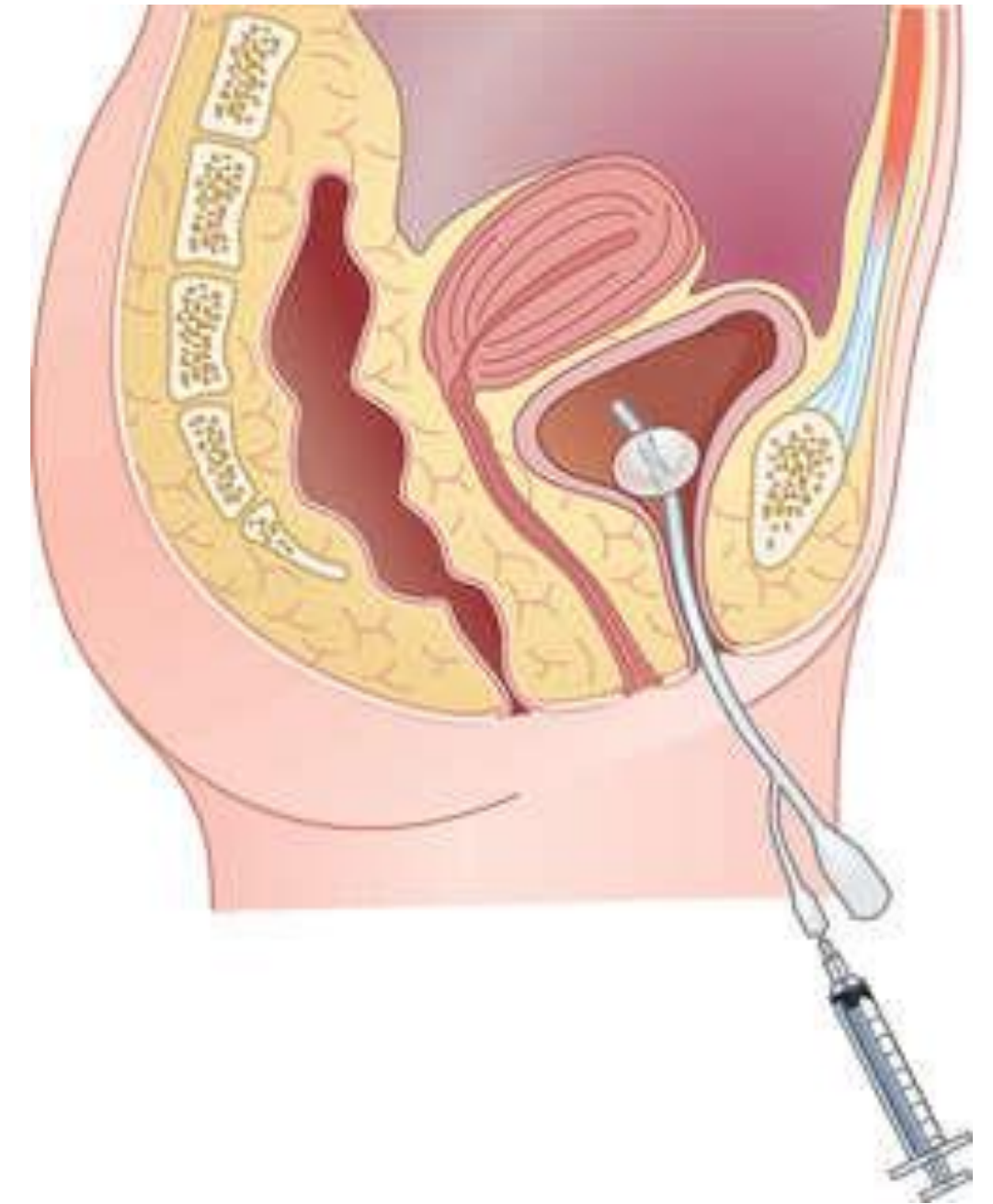
Host Factor



- Female – Short Urethra
- Male - uncircumcised infant ---- > bacterial colonization inside prepuce and urethra

Catherization

- DIRECT: Bacteria carried directly into bladder during insertion
- INDIRECT: Facilitation of bacterial access via lumen of catheter
- **Loss of neurological control of bladder** and sphincter (spina bifida , paraplegia, multiple sclerosis)

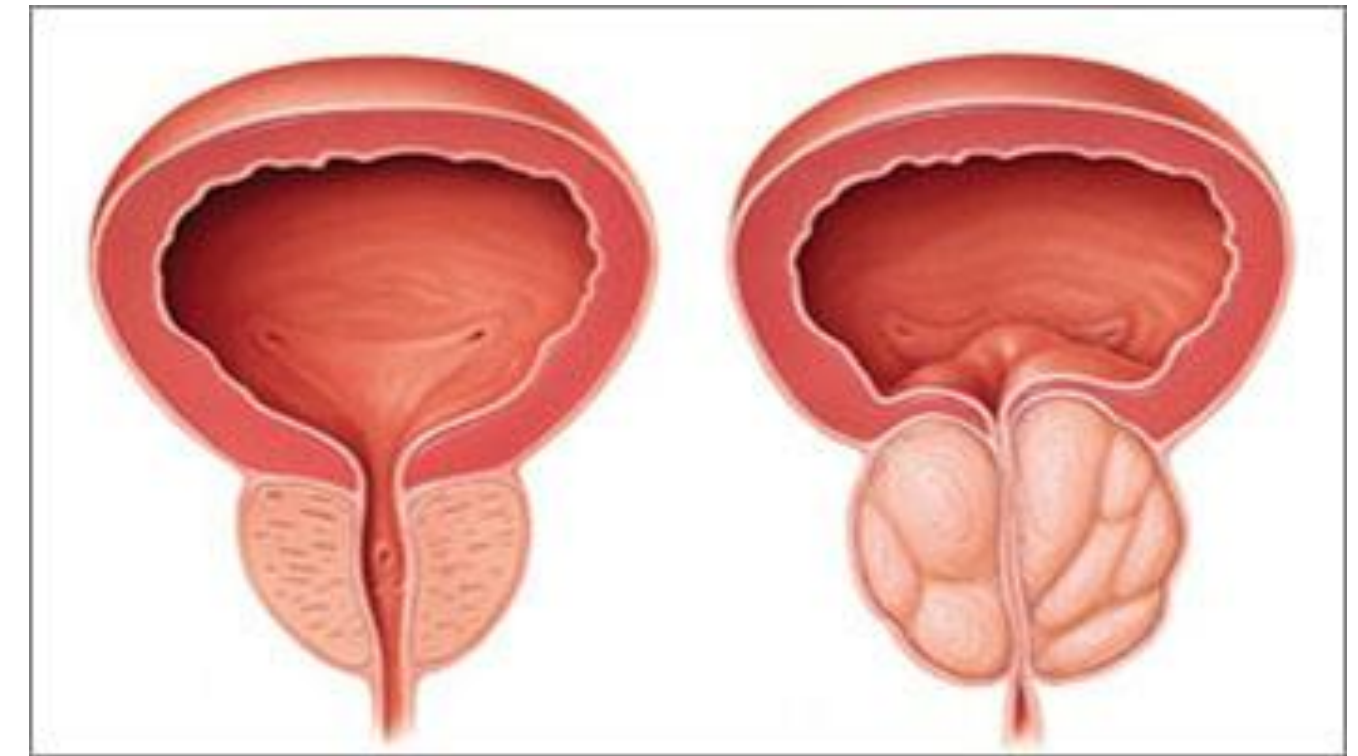




Host Factor



- **Vesicourethral reflux** (urine reflux from bladder to ureter, renal pelvis and parenchyma)
- Normal urine flow disruption (**obstruction**)
- **Incomplete bladder emptying** ----- > 2-3ml residual urine, leads to infection (ascent of infection) finally leads to pyelonephritis
- Pregnancy
- Prostatic hypertrophy
- Renal calculi
- Tumor
- Stricture
- **Diabetes Mellitus** ----- > diabetic neuropathy leads to functional abnormality in the bladder

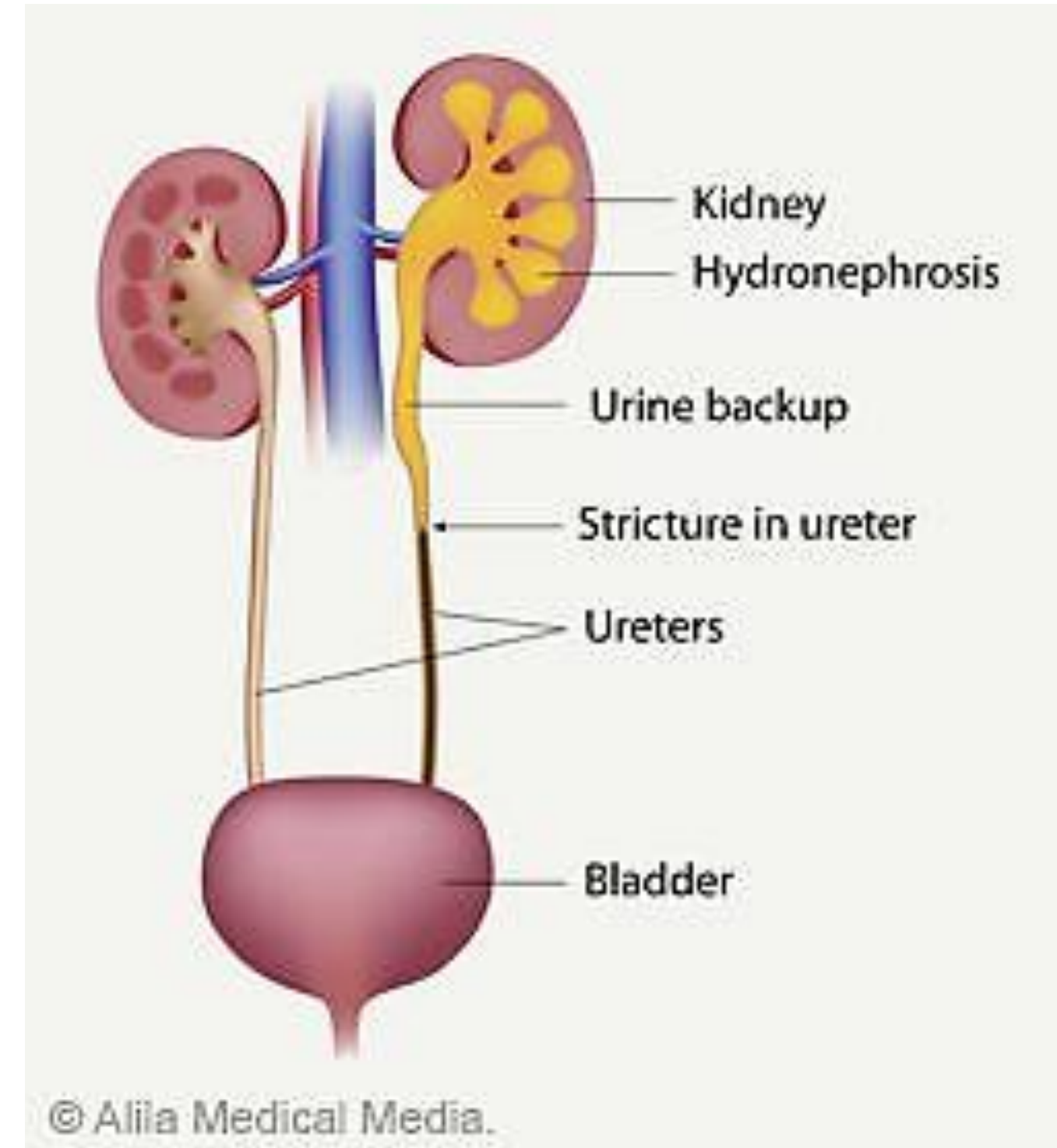




Host Factor



- Genetic background of the host
- Familial disposition to pyelonephritis
- Women with recurrent UTI
- Have had their first UTI before the age of 15 years
- Persistent vaginal colonization





Etiology



- The uropathogens causing Pyelonephritis vary by clinical syndrome but are usually enteric gram-negative rods that have migrated to the urinary tract

Gram negative organism

- E.coli (common), Citrobacter, klebsiella, enterobacter, proteus pseudomonas aeruginosa

Gram positive organism

- Staph.saprophyticus, Staph. Epidermidis enterococcus, Corynebacteria and lactobacilli
- **Virus** – Cytomegalovirus, rubella, Mumps and HIV
- **Parasite** - candida spp and histoplasma capsulatum (fungi) & trichomonas vaginalis (protozoa)



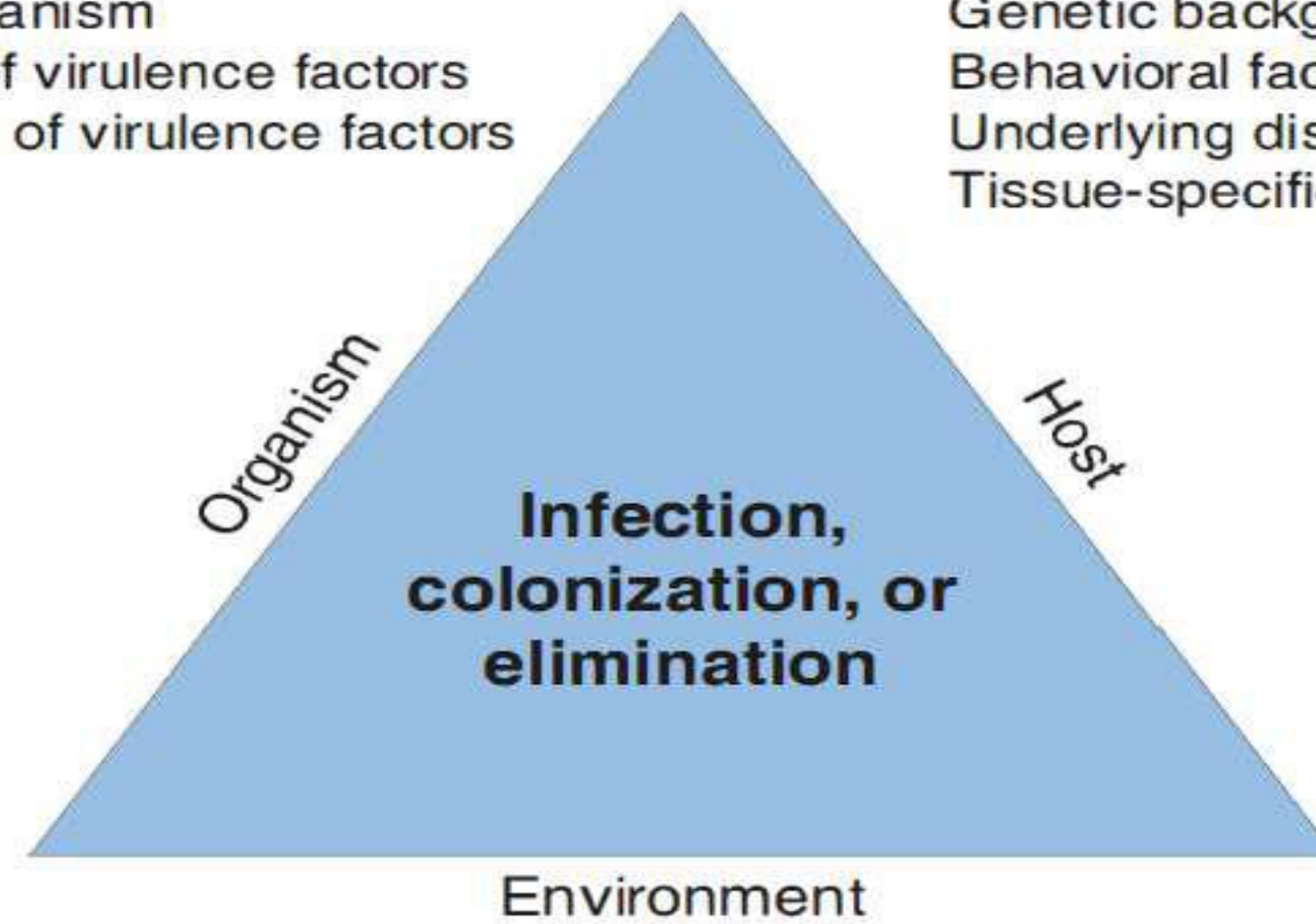
Pathogenesis

Organism

- Type of organism
- Presence of virulence factors
- Expression of virulence factors

Host

- Genetic background
- Behavioral factors
- Underlying disease
- Tissue-specific receptors



Environment

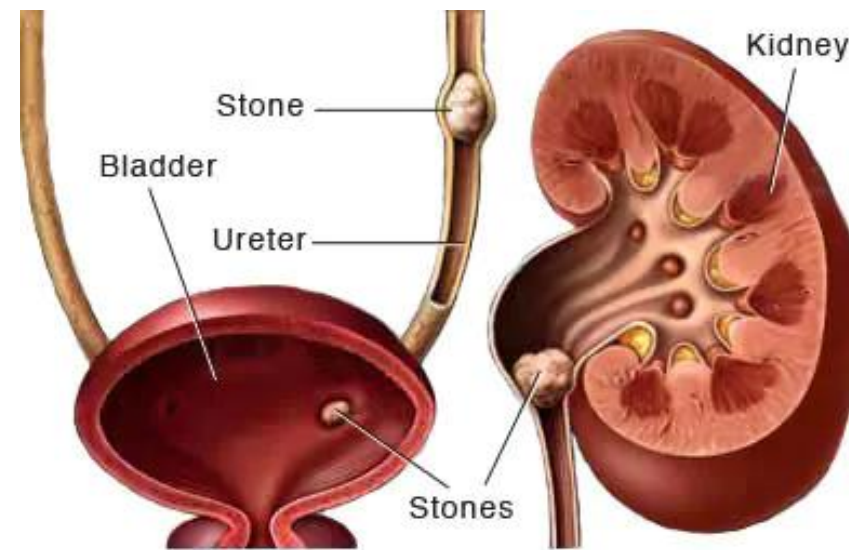
- Vaginal ecology
- Anatomy/urinary retention
- Medical devices

Vaginal Ecology:

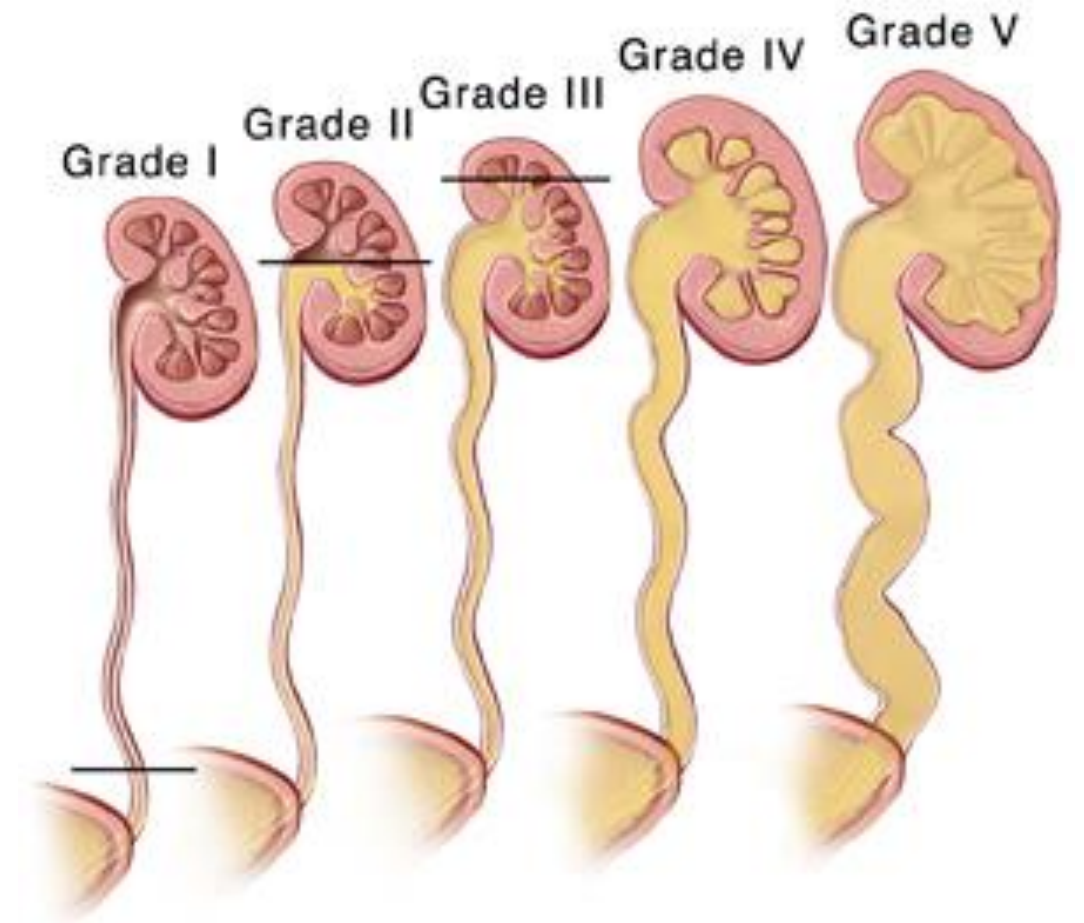
- Sexual intercourse is associated with an increased risk of vaginal colonization with E. coli

Anatomical And Functional Abnormalities:

- Urinary stasis or obstruction
- Foreign bodies: stones or urinary catheters
- Vesicoureteral reflux
- Ureteral obstruction secondary to prostatic hypertrophy
- Neurogenic bladder



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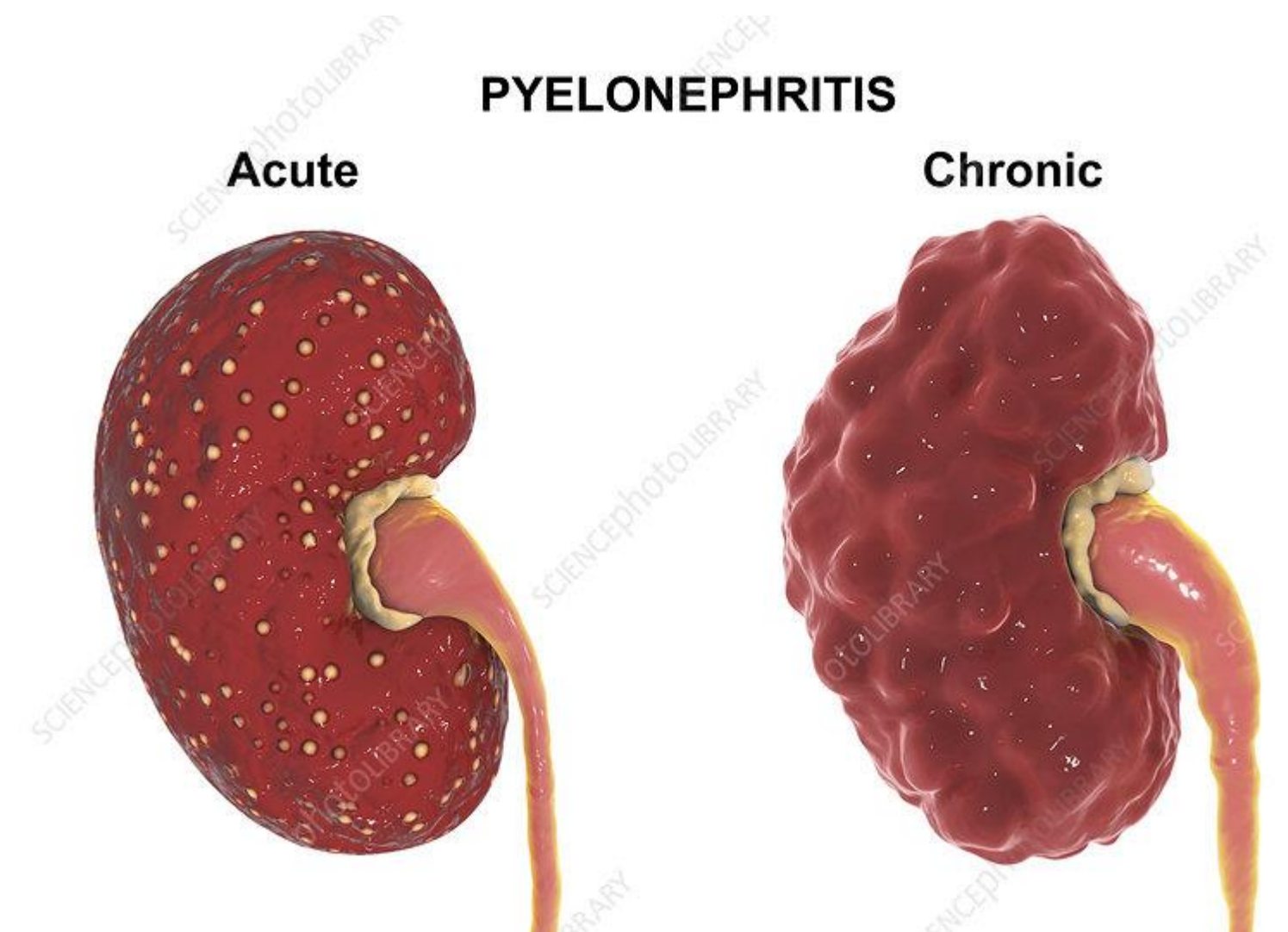




Types



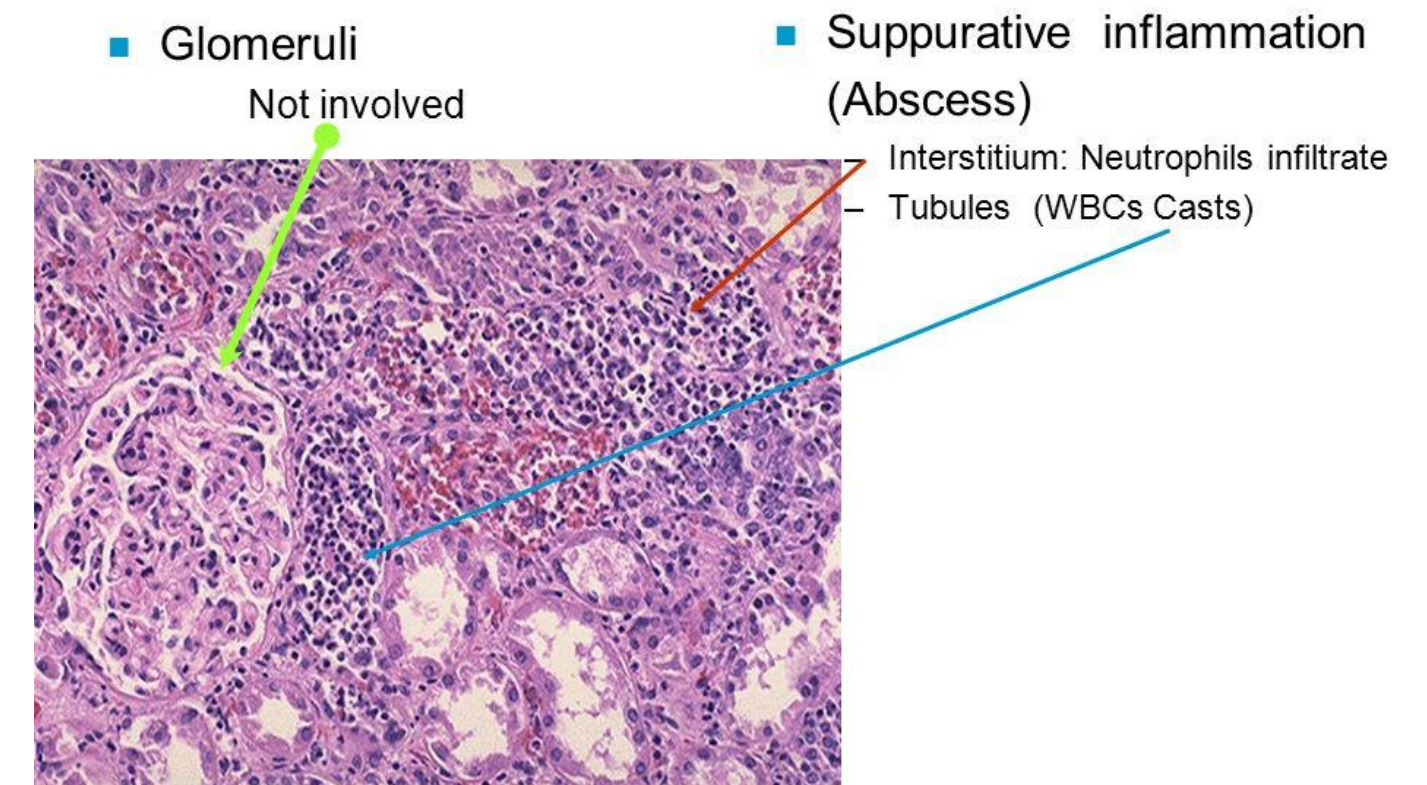
- **Acute pyelonephritis** - is an acute **suppurative** inflammation of the kidney caused by pyogenic bacteria.
- **Chronic pyelonephritis** - is a chronic **tubulointerstitial disease** resulting from repeated attacks of inflammation and scarring.
- **Tuberculous Pyelonephritis** - Tuberculosis of the kidney occurs due to **haematogenous spread** of infection from another site, most often from the lungs.



Acute Pyelonephritis – Morphology

- Acute pyelonephritis show **enlarged and swollen kidney** that bulges on section.
- The cut surface shows small, **yellow-white abscesses** with a haemorrhagic rim.
- These abscesses may be several millimetres across and are situated mainly in the **cortex**.
- **Destruction of the tubules** is present
- The acute inflammation may be in the form of **large number of neutrophils** in the interstitial tissue and bursting into tubules

Acute Pyelonephritis





Acute Pyelonephritis – Clinical Features



- Chills, fever
- Loin pain, lumbar tenderness
- Dysuria and frequency of micturition.
- Urine will show bacteria in excess of 100,000/ml, pus cells
- Pus cell casts in the urinary sediment.





Acute Pyelonephritis – Complications

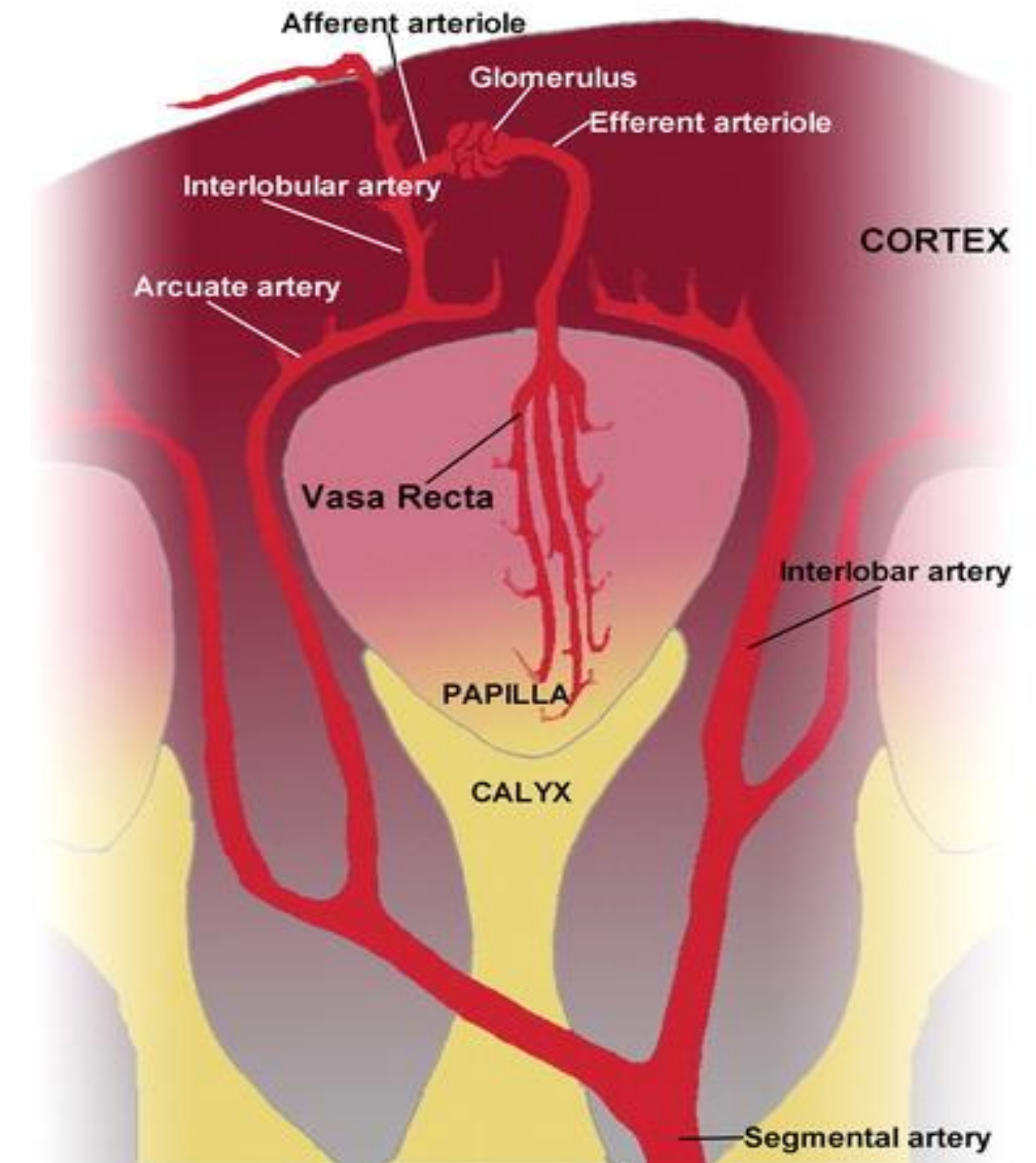


Papillary necrosis

- yellow to grey-white, sharply-defined areas with congested border and resemble infarction.
- The pelvis may be dilated.

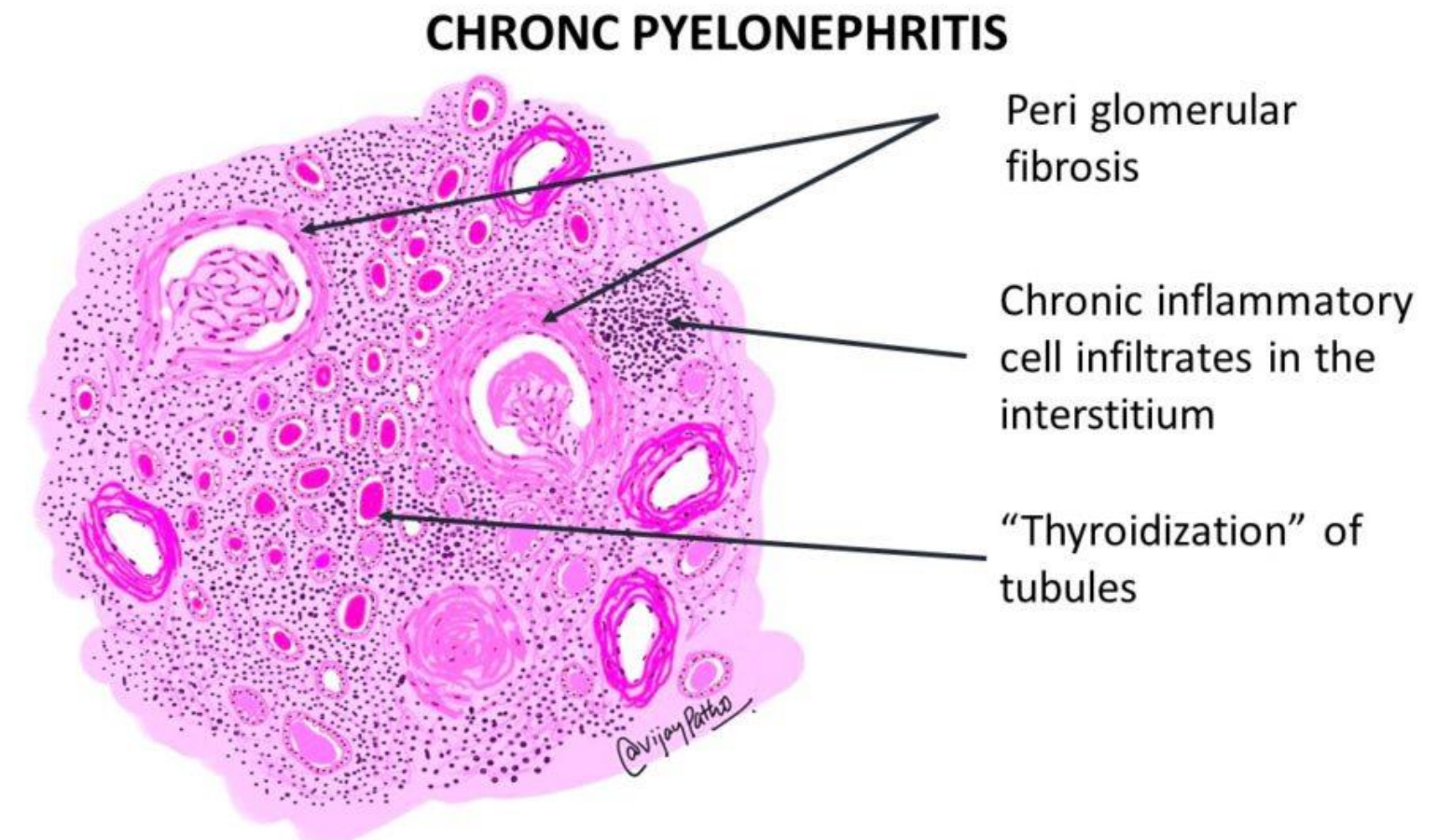
Pyonephrosis

- The abscesses in the kidney in acute pyelonephritis are extensive, particularly in cases with obstruction.



Chronic Pyelonephritis – Morphology

- The surface of the kidney is irregularly scarred; the capsule can be stripped off with difficulty due to adherence to scars.
- These scars are of variable size and show characteristic U-shaped depressions on the cortical surface.
- ***Xanthogranulomatous pyelonephritis*** is an uncommon variant characterised by collection of foamy macrophages admixed with other inflammatory cells and giant cells.

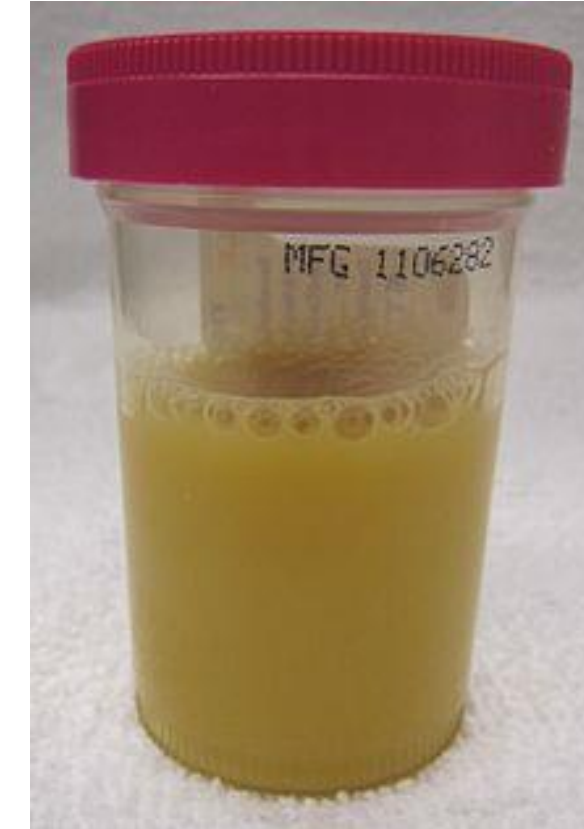




Chronic Pyelonephritis – Clinical Features



- Acute recurrent pyelonephritis with fever, loin pain, lumbar tenderness, dysuria, pyuria, bacteriuria and frequency of micturition.
- Diagnosis is made by **intravenous pyelography (IVP)**
- Culture of the urine may give positive results
- Longstanding cases of chronic pyelonephritis may develop secondary systemic amyloidosis



Tuberculous Pyelonephritis

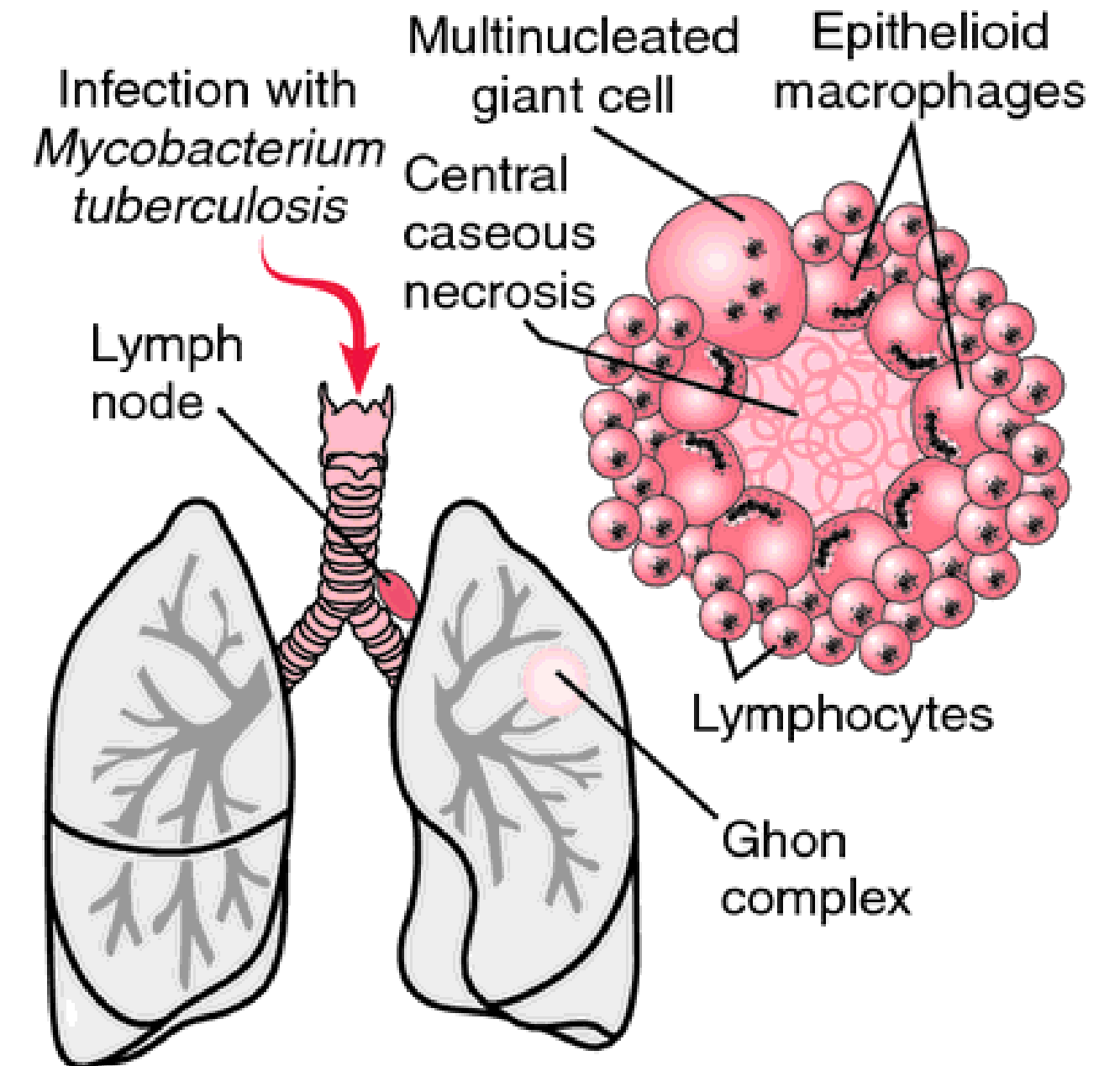
- Tuberculosis of the kidney occurs due to haematogenous spread of infection from another site, most often from the lungs.

Morphology:

- The lesions in tuberculous pyelonephritis are often bilateral, usually involving the medulla with replacement of the papillae by caseous tissue.

Clinical Features:

- Sterile pyouria, Microscopic haematuria and Mild proteinuria





Laboratory Diagnosis



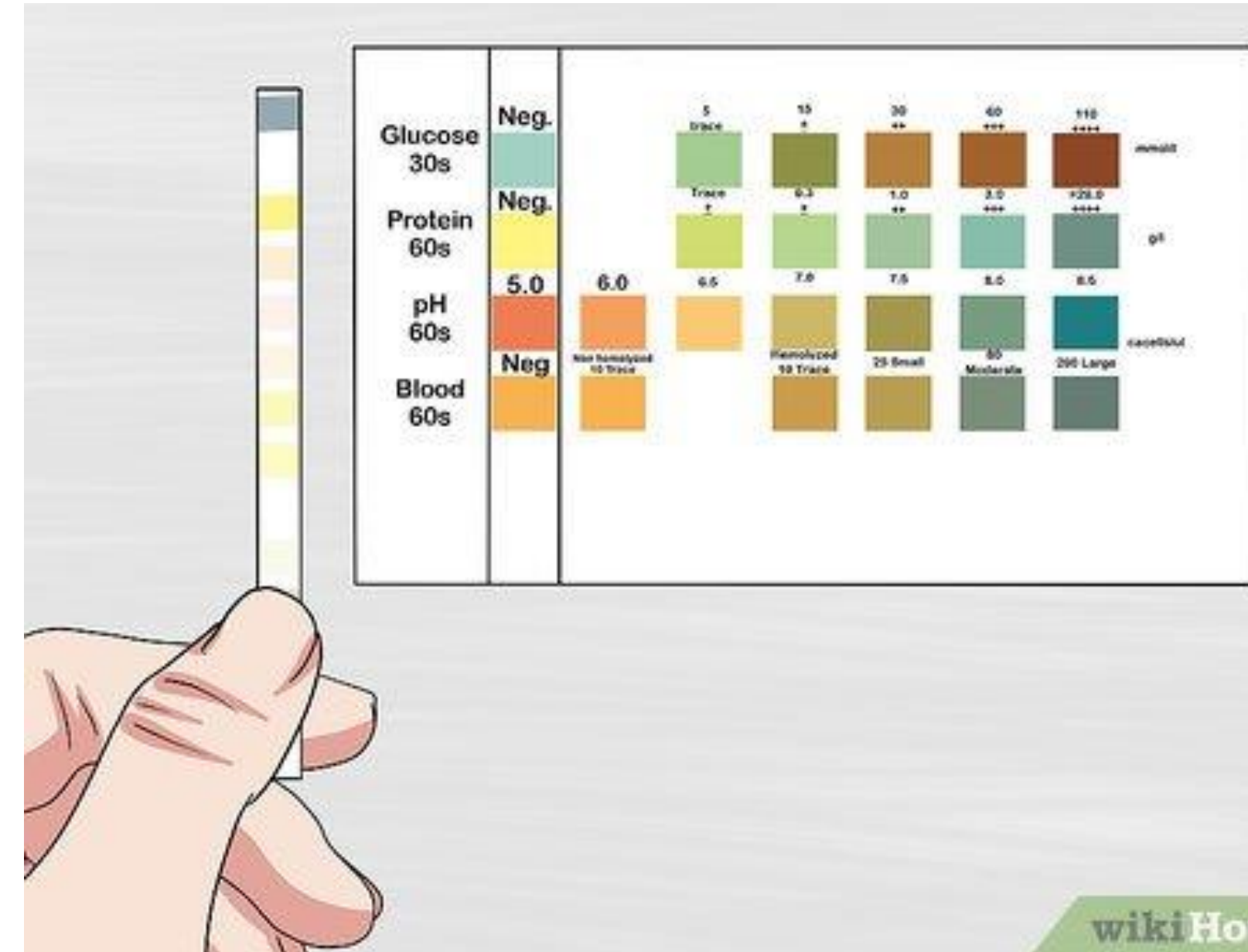
The Urine Dipstick Test:

- Rapid diagnostic test
- Appearance of WBC in urine

Urinalysis:

- WBC in Cast shape due to of pyelonephritis

Urine Culture - Straight Catheterization, Foley catheter, Suprapubic Aspiration





Treatment



- **Fluor quinolones** the first- line therapy for acute uncomplicated pyelonephritis
- **oral ciprofloxacin** - highly effective for the initial management of pyelonephritis in the outpatient setting
- **Combinations of a β -Lactam** (ampicillin-sulbactam) can be used in patients with more complicated histories previous episodes of pyelonephritis or recent urinary tract manipulations





THANK YOU



References:

- Text book of Pathology Harsh Mohan
- Textbook of Pathology for Allied Health Sciences, Ramadas Nayak